NFIP Reinsurance Timeline

- 2012 - 2014
  - Congress granted FEMA authority to secure reinsurance from the private reinsurance and capital markets through the Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) and the Homeowners Flood Insurance Affordability Act of 2014 (HFIAA).

- 2015
  - Flood Insurance Risk Study to investigate feasibility and benefits of an NFIP Reinsurance Program

- 2016
  - Test Placement of Reinsurance

- 2017
  - FEMA secured $1.042 billion in traditional reinsurance coverage from 25 reinsurers
  - Hurricane Harvey – FEMA recovered $1.042 billion in reinsurance
NFIP Reinsurance Timeline

- **2018**
  - FEMA secured $1.46 billion in traditional reinsurance coverage from 28 reinsurers
  - FEMA entered 3-year reinsurance agreement that transfers $500 million in NFIP risk to the capital markets

- **2019**
  - FEMA secured $1.32 billion in traditional reinsurance coverage from 28 reinsurers
  - FEMA entered 3-year reinsurance agreement that transfers $300 million in NFIP risk to the capital markets
Catastrophe Modeling

US Flood
U.S. Flood analytics – historical view

- Flood is a complex peril to model
  - Technological barriers made it difficult to adequately generate a complete view of flood hazard
  - Without a private market for residential flood, commercial vendors didn’t invest resources in developing a model
  - Technology advances and market pressures have changed the landscape of flood analytics
- FEMA maps have largely been the basis for evaluating flood risk in the U.S.
  - These maps only determine if a risk is in or out of a flood zone, without providing information on potential flood depths
  - FEMA maps are hazard-only, and do not consider vulnerability or financial terms to help determine losses
Coverage and extent of FEMA Flood Insurance Rate Maps (FIRMs)

- FEMA FIRMs do not cover the entire U.S.
  - There is not a consistent methodology for developing FEMA flood maps across the country
  - Many areas have maps that are outdated, based on old technology, or do not take into account construction and development
  - Older maps have not been digitized

- In many areas FEMA FIRMs cover the main rivers but not smaller streams
- It is important to model the water getting to the rivers as well as out of the rivers

Red outlines – FEMA 100 year flood zones
Blue shading – high resolution model including pluvial (surface) and fluvial (riverine) flooding
Hazard Analyst app – compare data sources

Left side displaying FEMA data

Right side displaying KatRisk data
Implementation: Insurance Innovations
The Tools: Indemnity / Parametric Insurance

**Indemnity**
- Pays on actual loss
- HIGH cost of loss adjustment
- Payment delays due to loss adjustment

**Parametric**
- Faster Payment upon triggering event
- Simple, easy to understand
- Event trigger defined by independent agency data (USGS, NOAA)
- Basis Risk

Images courtesy of NOAA
HydroMet Triggers

- Rainfall
- Flow / CFS
- Water Surface Elevation
- Wind Speed
- Temperature

Gage images courtesy of NOAA
Structuring for a Trigger-Based Solution for Flood and Drought Case Study for Texas River District

- Risks from localized rainfall and river flows from upstream precipitation
- Structure accounts for both of these risks with separate triggers that can operate independently and in combination
- Graduated payouts support non-damage costs and damaging droughts and floods
Public Finance & Credit Risk
US Public Finance Issue Ratings By Sector

Of nearly 17,000 US public finance ratings, almost 80% are secured by taxes or an appropriation by a government entity.
What Is A Credit Rating?
Assessing Creditworthiness of Issuers and Obligations

<table>
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<tr>
<th>What Credit Ratings Are</th>
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<td>Opinions about relative credit risk</td>
<td>Indications of market liquidity or price</td>
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<tr>
<td>Opinions about ability and willingness of an issuer to meet financial obligations in full and on time</td>
<td>Investment advice or guarantee of future credit risk</td>
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<tr>
<td>Forward-looking and continually evolving</td>
<td>Absolute measures of default probability</td>
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<td>Comparable across different sectors and regions</td>
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### Ratings Factors*

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<td>Debt &amp; Contingent Liabilities</td>
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Case Study: Rockport, Texas

- Approximately **80% of structures** in Aransas County sustained damage from Hurricane Harvey
- **60% of residents** were displaced
- Rockport was **downgraded** based on credit rating agency’s view of:
  - Potential tax base deterioration
  - Revenue declines
  - Rockport’s uncertainty with regard to its budgetary performance and flexibility following Harvey
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